Economic Heterogeneity in the Atlantic and Gulf of Mexico Longline Fishery.

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Sociologists have made a point of emphasizing the differences in communities and community structures in the management of fisheries. I wanted to see if there were differences in economic behavior if behavior were studied on a more local level.

The purpose of the paper:

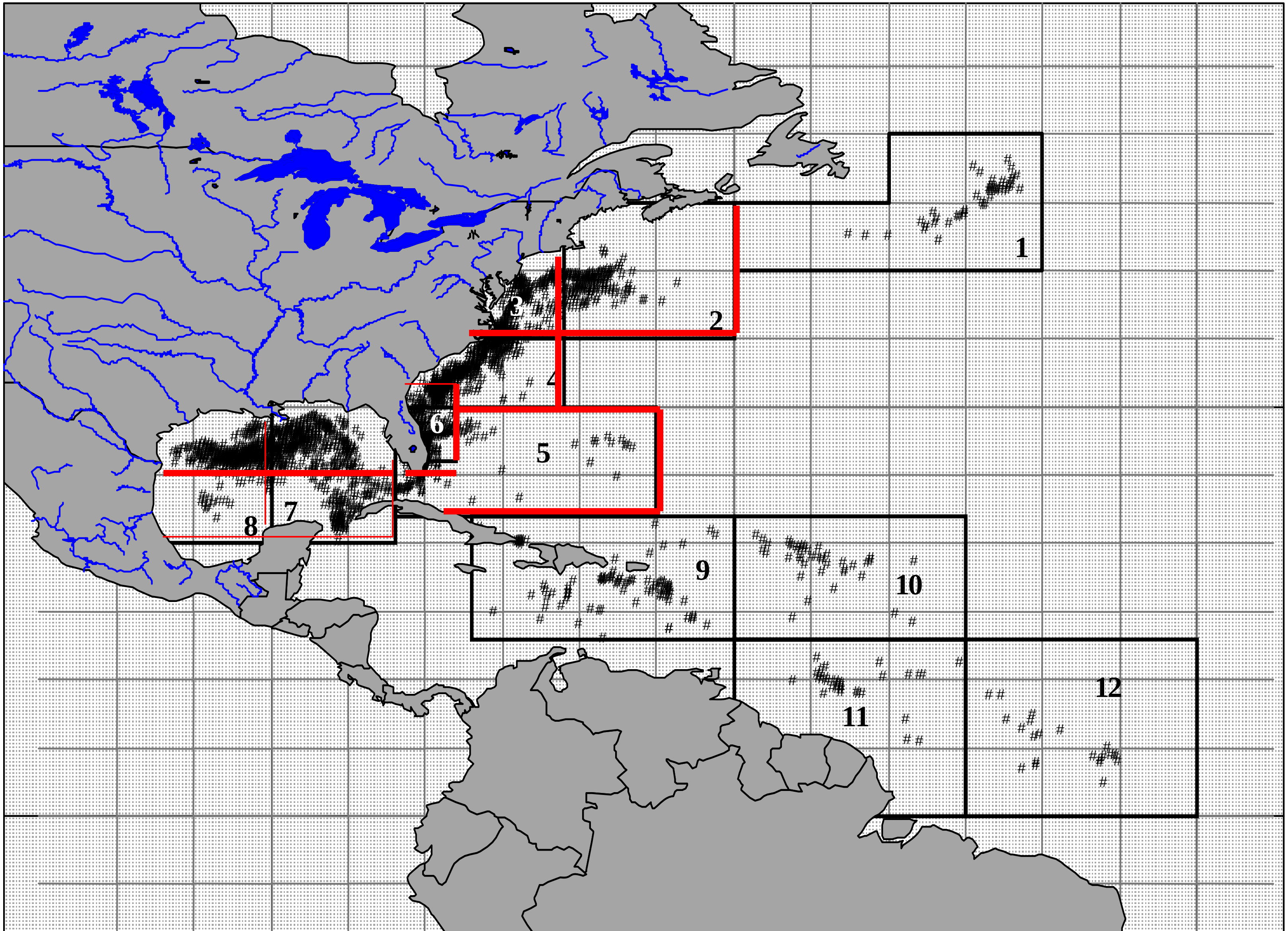
Examine how the activities and risk preferences of fishermen vary at a localized scale.

Why risk preferences?

What scale?

What setting?

Figure III.1: Area Definitions and Distribution of Swordfish/Tuna Trip Observations



N-S

Table 1: Average Characteristics of Longline Trips, by Region of Homeport, 1996

Homeport Region	# Observed	Sets	% Trips Switched Homeport	% Trips Returned to Previous Site	Swordfish Revenues	Tuna Revenues	Estimated Miles Travelled
New England (including NY)	138	6.43	11.6	58	3942	5762	428
New Jersey	115	8.18	9.5	51	3679	8489	443
Maryland/Virginia	69	5.53	4.3	64	2432	4160	321
North Carolina	133	3.74	5.2	68	1867	4479	315
Florida Northeast	73	5.33	4.4	56	3549	2329	286
Florida Southeast	451	3.98	9.3	71	4082	729	223
Florida Keys	38	2.37	2.6	79	2658	735	276

E-W

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Florida Keys	38	2.37	2.6	79	2658	735	276
Florida Southwest	67	5.29	1.5	84	2337	3416	354
Florida Panhandle	89	5.60	1.1	87	2180	5584	377
Louisiana	229	5.31	2.1	76	1856	8961	360
Texas	29	5.55	3.4	90	1619	8106	433

My intentions are to examine the fishing location and return homeport decision. The fishing areas are defined according to the map and the homeport region

1.) New England- ports north of New York;
2.) Mid-Atlantic- ports north of Cape Hatteras to, but not including, Connecticut;
3.) South Atlantic- ports south of Cape Hatteras to Florida;
4.) East Coast of Florida- ports north of Key West to, but not including, Georgia;
5.) Eastern Gulf of Mexico- ports east of Lousiana to Key West;
6.) Western Gulf of Mexico- ports east of Mexico to, but not including, Mississippi

We used a random utility model specification where Individual n on trip t chooses the location/landing port choice J by maximizing expected utility:

$$V_{nt}^{*} = \underset{j=1,\ldots,j}{Max} \left\{ E\,\overline{U}_{n1t} + \varepsilon_{n!t}, \ldots, E\,\overline{U}_{nJt} + \varepsilon_{nIt} \right\}$$

for which the second order approximation for the expected utility is:

$$\boldsymbol{EU(W_j) \approx U(W^0 + E(\pi_j)) + \frac{1}{2} * \frac{\partial^2 U(W^0 + E(\pi_j))}{\partial W^2} * \sigma_j^2(\pi_j)}$$

Must specify the utility function and have the initial wealth. Two commonly used utility function are the logarithmic and the quadratic. The second order approximation for these was attempted :

Quadratic utility (2 parameters)

$$EU(W_j) = \alpha\left[W^0 + E(\pi_j)\right] + \beta\left[\left(W^0 + E(\pi_j)\right)^2 + \sigma_j^2(\pi_j)\right]$$

Log utility (one parameter)

$$EU(W_j) = \gamma[ln(W_0 + E(\pi_j)) + \frac{\sigma_j^2(\pi_j)}{2\times(W_0 + E(\pi_j))^2}]$$

What is needed are the expected lottery returns (net payoffs at site/port) and the initial wealth position.

Developed expected returns based on harvests (catch/set mile) for each of the possible combinations. Used a weighted combination of all trips in area/port for the last three weeks. Did not use previous history. Calculated the mean and variance for these to develop the expected returns. Computed costs on the basis of miles from homeport.

Wealth was estimated by using the market value of the vessel as estimated by Porter et al. and by assuming that everyone’s net wealth was 0.

Table 3: Estimated Random Utility Parameters- EAST COAST

Homeport Region	Estimated Coefficients (Standard Error)		
	Net Revenue ($\$ 10^{-3}$) a	Quadratic Term (10^{-6}) β	Psuedo r-squared
New England	0.32	-0.0072	.34
New Jersey	0.05	-0.0001	.24
Maryland/ Virginia	0.34	-0.0020	.28
North Carolina	0.45	-0.0015	.32
South Carolina	0.33	-0.0064	.28
Northeast Florida	0.22	-0.0031	.23
Southeast Florida	0.45	-0.0115	.26

With Wealth= Market Value of Vessel

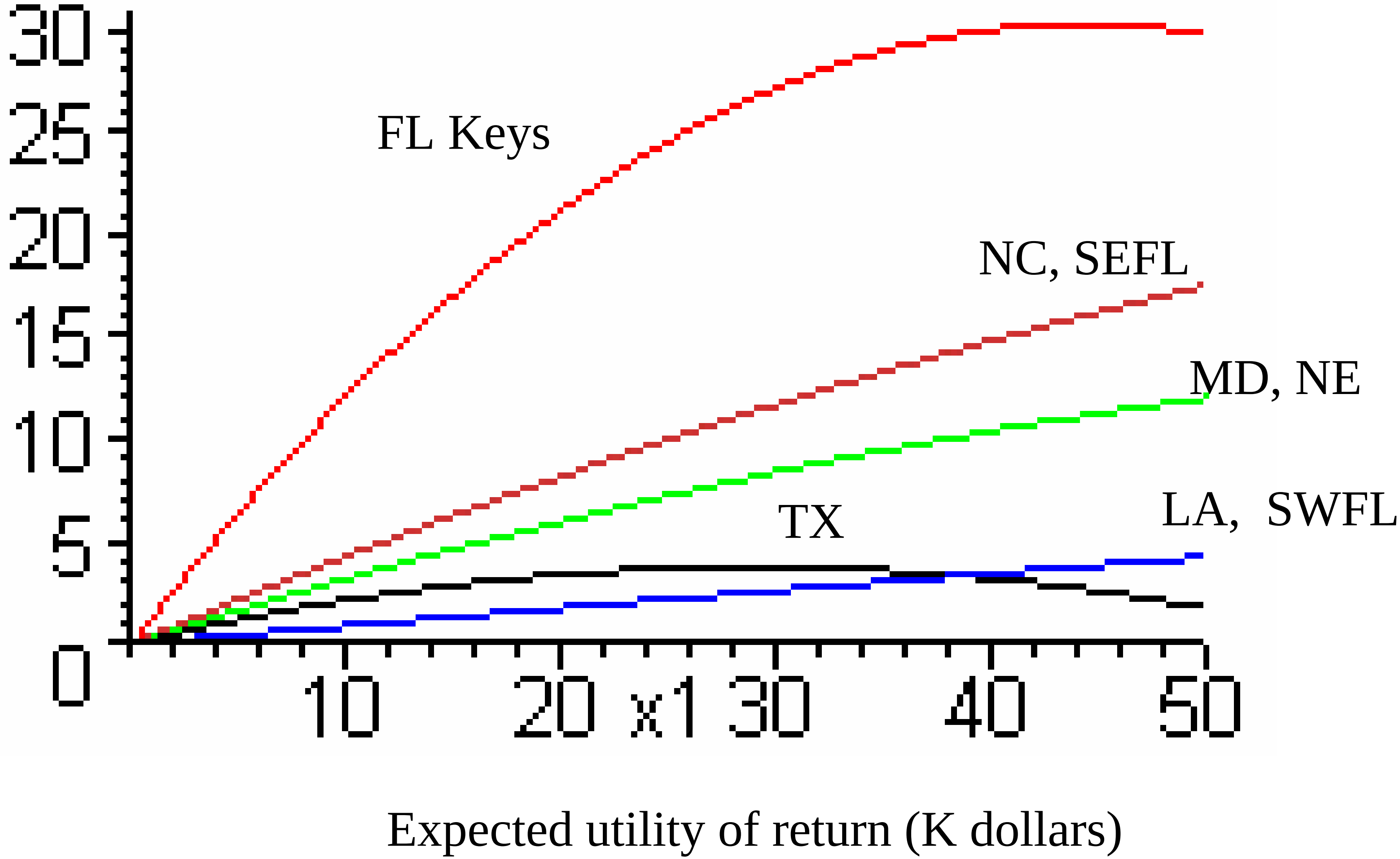
Table 3: Estimated Random Utility Parameters- EAST COAST

Homeport Region	Estimated Coefficients (Standard Error)		
	Net Revenue ($\$ 10^{-3}$)	Quadratic Term (10^{-6})	Psuedo r-squared
New England	0.1854	-0.0004	0.26
New Jersey	0.0758	-0.0001	0.24
Maryland/ Virginia	0.5546	-0.0010	0.25
North Carolina	63.2317	-0.1088	0.23
South Carolina	0.1753	-0.0003	0.24
Northeast Florida	0.2301	-0.0006	0.22
Southeast Florida	25.4121	-0.0598	0.22

Table 4: Estimated Random Utility Parameters- GULF OF MEXICO

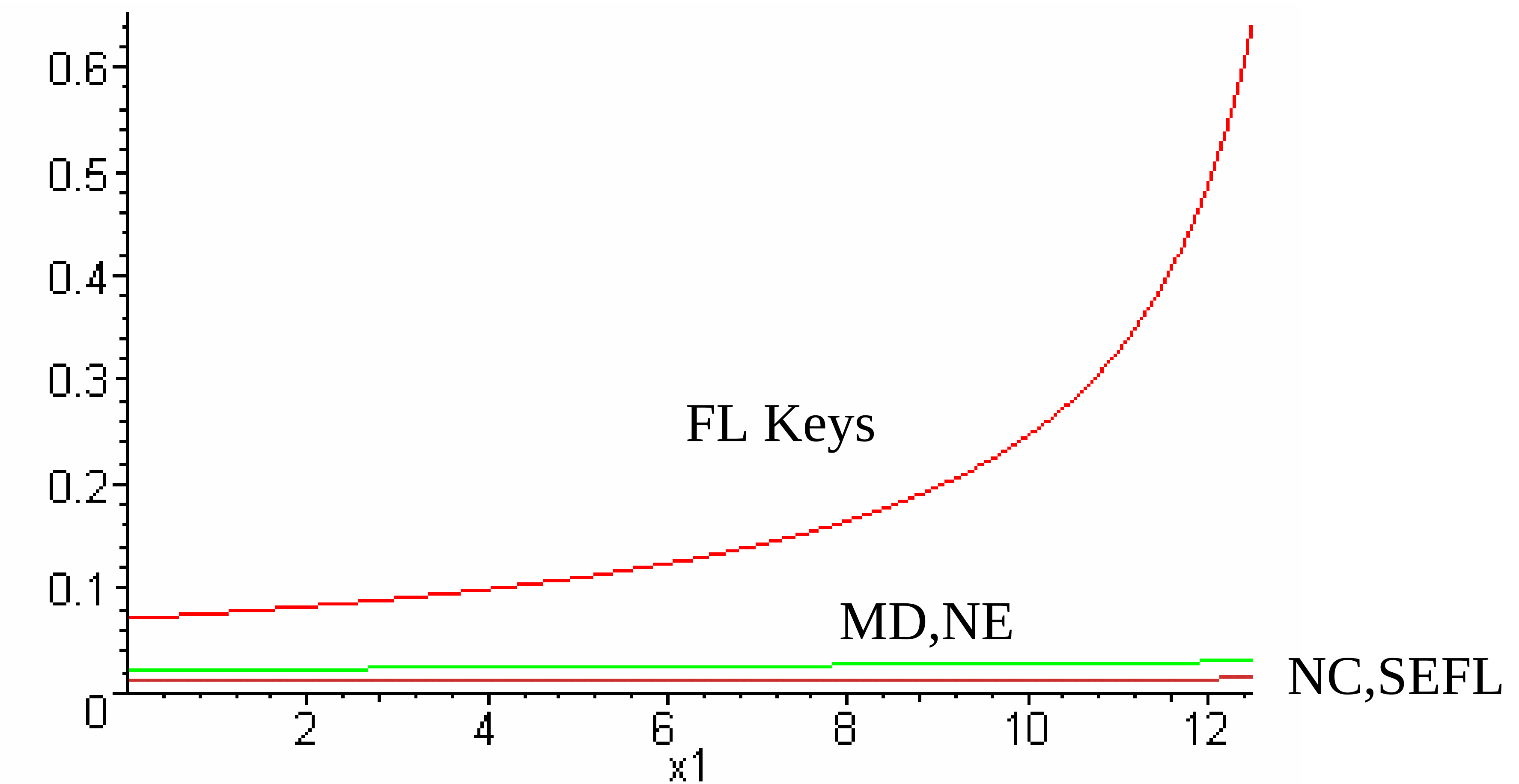
Homeport Region	Estimated Coefficients (Standard Error)		
	Net Revenue ($ 10^{-3})	Quadratic Term (10^{-6})	Psuedo r-squared
Florida Keys	1.37	-0.0155	.37
Florida Southwest	0.09	-0.0001	.25
Florida Panhandle	-0.04	-0.0007	.26
Louisiana	0.09	-0.0001	.26
Texas	0.26	-0.0045	.32

$$U(R)=\alpha[R]+\beta\left[\left((R)\right)^{2}\right]$$



A Measure
of risk aversion

$$= AP(R) = -\frac{U''}{U'} = -\frac{2\beta}{(\alpha + 2\beta r)}$$



Arrow-Pratt Measure versus Return (K dollars)

But in the random utility case, we (the researchers) do not know exactly what U is, only know EU:

$$EU(R_j) \approx U(E(R_j)) + \frac{1}{2} * \frac{\partial^2 U(E(R_j))}{\partial R^2} * \sigma_j^2(R_j)$$

$$\frac{\partial EU(R_j)}{\partial R_j} = \pi_j \frac{\partial U(R_j, V_{Rj}, W)}{\partial R_j}$$

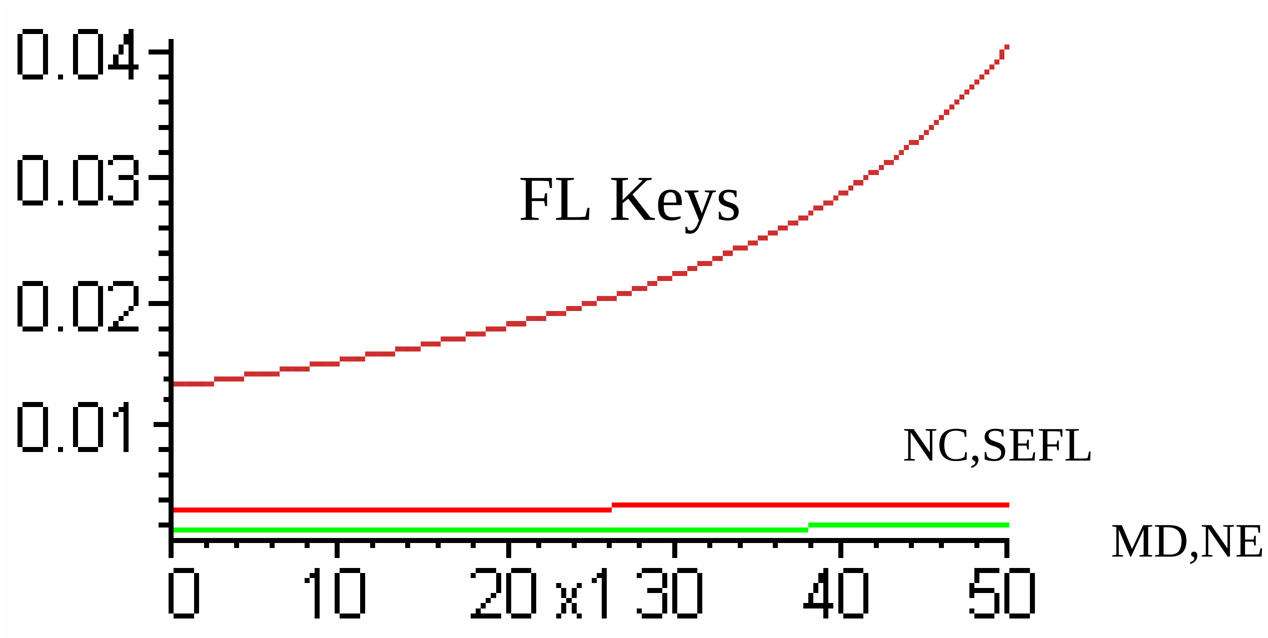
$$\frac{\partial^2 EU(R_j)}{\partial R_j^{\,2}} = \pi_j \left(\frac{\partial U^2(R_j, V_{Rj}, W)}{\partial R_j^{\,2}} \right) + \pi_j (1 - \pi_j) \left(\frac{\partial U(R_j, V_{Rj}, W)}{\partial R_j} \right)$$

$$\boldsymbol{AP(r)^{*}} = -\frac{\underbrace{\frac{\partial^2 u(r_a, v_a, w)}{\partial r_a^{\,2}}\pi_a}_{<0} + \underbrace{\left(\frac{\partial u(r_a, v_a, w)}{\partial r_a}\right)^2 \pi_a(1-\pi_a)}_{>0}}{\pi_a \frac{\partial u(r_a, v_a, w)}{\partial r_a}}$$

For the quadratic case:

$$-\frac{\underbrace{2\beta\pi_a}_{<0} + \underbrace{(2\beta)^2 \pi_a(1-\pi_a)}_{>0}}{\pi_a(\alpha + \beta r_a)}$$

Computed *AP(R)** for fixed levels of probabilities and obtain similar results to before but one reversal:



*AP(R)** versus returns

But π depends on R and should program that into it. This may eliminate the property of increasing risk aversion. Yet to be done.

Conclusions:

Economic structure as well as risk preferences do vary at local levels. Still it may be a function of the resource stocks.

Found that individuals operating in the Florida Keys had the greatest aversion to risk, both when considering the researcher’s uncertainty and when not.

The other risk aversion parameters were not too dissimilar. Will likely try to test for significant differences.